This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

We claim:

1) (currently amended) An automated storage and retrieval device for trays holding subject matter, comprising:

A) a storage rack comprising a plurality of vertically aligned storage slots for vertically storing a plurality of trays,

B) at least one automated machine,

C) a storage gantry for vertical and horizontal movement of said plurality of trays between said storage rack and said at least one automated machine, said storage gantry being adopted to remove a tray from any one of said plurality of vertically aligned storage slots and to return a tray to any one of said plurality of vertically aligned storage slots, and

D) at least one computer system programmed to control said storage gantry.

2) (original) The automated storage and retrieval device as in Claim 1 further comprising an access device, wherein said storage gantry moves said plurality of trays between said storage rack and said access device.

3) (original) The automated storage and retrieval device as in Claim 1, wherein said at least one automated machine is an inspection device.

4) (original) The automated storage and retrieval device as in Claim 3, wherein said inspection device is a device for inspecting and classifying a plurality of microscopic crystals.

5) (previously presented) The automated storage and retrieval device as in Claim 4, wherein said at least one inspection device comprises:

E) at least one camera,

F) an indexing device for sequentially placing said microscopic crystals in camera-view of said at least one camera, and

G) at least one control computer programmed to control said indexing device and said at least one camera, wherein said at least one control computer is programmed to receive from said at least one camera images of said plurality of microscopic crystals.

6) (original) The automated storage and retrieval device as in Claim 5, wherein said at least one control computer automatically classifies said plurality of microscopic crystals after receiving said images.

7) (previously presented) The automated storage and retrieval device as in Claim 1, wherein said automated machine comprises:

E) at least one camera,

F) an indexing device for receiving said plurality of trays and for placing said subject matter in camera view of said at least one camera,

G) at least one control computer programmed to control said indexing device and said at least one camera, wherein said at least one control computer is programmed to receive from said at least one camera images of said subject matter.

8) (original) The automated storage and retrieval device as in Claim 7, wherein said automated machine further comprises an LED light source for illuminating said subject matter.

9) (original) The automated storage and retrieval device as in Claim 1, wherein said at least one automated machine is an automated micro-well plate filling machine.

10) (previously presented) The automated storage and retrieval device as in Claim 1, wherein said at least one automated machine comprises:

E) a micro-well plate filling assembly, comprising:

1. an indexing device, and

2. a fill mechanism in communication with a media source and positioned to insert portions of said media into the empty micro-well plates, and

F) an automatic control unit programmed to cause said indexing device to move empty micro-well plates adjacent to said fill mechanism, and to cause said fill mechanism to inject media from said media source into wells in the micro-well plates.

11) (original) The automated storage and retrieval device as in Claim 1, wherein said subject matter is solution inside at least one micro-well plate.

12) (original) The automated storage and retrieval device as in Claim 11, wherein said at least one micro-well plate comprises a bar code, wherein said automated storage and retrieval device further comprises at least one bar code reader in communication with said at least one computer system.

13) (previously presented) The automated storage and retrieval device as in Claim 1, wherein said plurality of trays holds at least one micro-well plate, wherein said storage gantry comprises at least one robotic gripper, wherein said plurality of trays comprises:

E) at least one cut-down access area for said at least one robotic gripper,

F) a corner flat for tray orientation, and

G) a plurality of tapered guide pillars for guiding said at least one micro-well plate into said plurality of trays.

14) (currently amended) A method for automatically storing and retrieving a plurality of trays, wherein said plurality of trays holds subject matter, comprising the steps of:

A) vertically placing a plurality of trays into a storage rack, comprising a plurality of vertically aligned storage slots,

B) transferring via a storage gantry utilizing vertical and horizontal movement said plurality of trays from said storage rack to an automated machine, said storage gantry being adopted to remove a tray from any one of said plurality of vertically aligned

storage slots and to return a tray to any one of said plurality of vertically aligned storage slots, and

C) transferring via said storage gantry utilizing vertical and horizontal movement said plurality of trays from said automated machine to said storage rack, and

D) controlling the movement of said storage gantry via at least one programmed computer system.

15) (original) The method as in Claim 14, further comprising the step of inserting said plurality of trays into an access device, wherein said storage gantry transfers said plurality of trays from said access device to said storage rack and from said storage rack to said access device.

16) (original) The method as in Claim 14, wherein said subject matter is a plurality of microscopic crystals and at least one automated machine is a device for inspecting and classifying said plurality of microscopic crystals.

17) (previously presented) The method as in Claim 16, wherein said at least one automated machine comprises:

E) at least one camera,

F) an indexing device for sequentially placing said microscopic crystals in camera-view of said at least one camera, and

G) at least one control computer programmed to control said indexing device and said at least one camera, wherein said at least one control computer is programmed to receive from said at least one camera images of said plurality of microscopic crystals, wherein said at least one control computer is programmed to classify said plurality of microscopic crystals.

18) (original) The method as in Claim 17, wherein said at least one control computer automatically classifies said plurality of microscopic crystals after receiving said images.

19) (original) The method as in Claim 14, wherein said at least one automated machine is an automated micro-well plate filling machine.

20) (previously presented) The method as in Claim 14, wherein said at least one automated machine comprises:

E) a micro-well plate filling assembly, comprising:

1. an indexing device, and
2. a fill mechanism in communication with a media source and positioned to insert portions of said media into the empty micro-well plates, and

F) an automatic control unit programmed to cause said indexing device to move empty micro-well plates adjacent to said fill mechanism, and to cause said fill mechanism to inject media from said media source into wells in the micro-well plates.

21) (original) The method as in Claim 14, wherein said plurality of trays holds at least one micro-well plate.

22) (original) The method as in Claim 21, wherein said at least one micro-well plate comprises a bar code, wherein said automated storage and retrieval device further comprises at least one bar code reader in communication with said at least one computer system.

23) (previously presented) The method as in Claim 14, wherein said plurality of trays holds at least one micro-well plate, wherein said storage gantry comprises at least one robotic gripper, wherein said plurality of trays comprises:

E) at least one cut-down access area for said at least one robotic gripper,

F) a corner flat for tray orientation, and

G) a plurality of tapered guide pillars for guiding said at least one micro-well plate into said plurality of trays.

24) (previously presented) The method as in Claim 14, wherein said automated machine comprises:

E) at least one camera,

F) an indexing device for receiving said plurality of trays and for placing said subject matter in camera view of said at least one camera,

G) at least one control computer programmed to control said indexing device and said at least one camera, wherein said at least one control computer is programmed to receive from said at least one camera images of said subject matter.

25) (currently amended) An automated storage and retrieval device for trays holding subject matter, comprising:

A) a storage rack means comprising a plurality of vertically aligned storage slots for vertically storing a plurality of trays,

B) at least one automated machine means,

C) a storage gantry means for vertical and horizontal movement of said plurality of trays between said storage rack means and said at least one automated machine means, said storage gantry means being adopted to remove a tray from any one of said plurality of vertically aligned storage slots and to return a tray to any one of said plurality of vertically aligned storage slots, and

D) at least one computer system means programmed to control said storage gantry means.

26) (previously presented) The automated storage and retrieval device as in Claim 25 further comprising an access means, wherein said storage gantry means moves said plurality of trays between said storage rack means and said access means.

27) (previously presented) The automated storage and retrieval device as in Claim 25, wherein said at least one automated machine means is an inspection means.

28) (previously presented) The automated storage and retrieval device as in Claim 27, wherein said inspection means is a device for inspecting and classifying a plurality of microscopic crystals.

29) (previously presented) The automated storage and retrieval device as in Claim 28, wherein said at least one inspection means comprises:

E) at least one camera,

F) an indexing means for sequentially placing said microscopic crystals in camera-view of said at least one camera, and

G) at least one control computer programmed to control said indexing means and said at least one camera, wherein said at least one control computer is programmed to receive from said at least one camera images of said plurality of microscopic crystals.

30) (previously presented) The automated storage and retrieval device as in Claim 29, wherein said at least one control computer automatically classifies said plurality of microscopic crystals after receiving said images.

31) (previously presented) The automated storage and retrieval device as in Claim 25, wherein said automated machine means comprises:

E) at least one camera,

F) an indexing means for receiving said plurality of trays and for placing said subject matter in camera view of said at least one camera,

G) at least one control computer programmed to control said indexing means and said at least one camera, wherein said at least one control computer is programmed to receive from said at least one camera images of said subject matter.

32) (previously presented) The automated storage and retrieval device as in Claim 31, wherein said automated machine means further comprises an LED light source for illuminating said subject matter.

33) (previously presented) The automated storage and retrieval device as in Claim 25, wherein said at least one automated machine means is an automated micro-well plate filling machine.

34) (previously presented) The automated storage and retrieval device as in Claim 25, wherein said at least one automated machine means comprises:

E) a micro-well plate filling assembly, comprising:

1. an indexing device, and
2. a fill mechanism in communication with a media source and positioned to insert portions of said media into the empty micro-well plates, and

F) an automatic control unit programmed to cause said indexing device to move empty micro-well plates adjacent to said fill mechanism, and to cause said fill mechanism to inject media from said media source into wells in the micro-well plates.

35) (previously presented) The automated storage and retrieval device as in Claim 25, wherein said subject matter is solution inside at least one micro-well plate.

36) (previously presented) The automated storage and retrieval device as in Claim 35, wherein said at least one micro-well plate comprises a bar code, wherein said automated storage and retrieval device further comprises at least one bar code reader in communication with said at least one computer system.

37) (previously presented) The automated storage and retrieval device as in Claim 25, wherein said plurality of trays holds at least one micro-well plate, wherein said storage gantry comprises at least one robotic gripper, wherein said plurality of trays comprises:

E) at least one cut-down access area for said at least one robotic gripper,

F) a corner flat for tray orientation, and

G) a plurality of tapered guide pillars for guiding said at least one micro-well plate into said plurality of trays.

38) (currently amended) A method for growing protein crystals, comprising the steps of:

A) inserting drops of protein solution into a plurality of micro-well plates,

B) placing said plurality of micro-well plates onto a plurality of trays,

C) vertically placing said plurality of trays into a storage rack <u>comprising a plurality of vertically aligned storage slots,</u>

D) transferring via a storage gantry utilizing vertical and horizontal movement said plurality of trays from said storage rack to an automated machine, said storage gantry being adopted to remove a tray from any one of said plurality of vertically aligned storage slots and to return a tray to any one of said plurality of vertically aligned storage slots,

E) analyzing via said automated machine said drops of protein solution,

F) transferring via said storage gantry utilizing vertical and horizontal movement said plurality of trays from said automated machine to said storage rack, and

G) controlling the movement of said storage gantry via at least one programmed computer system.

39) (currently amended) Protein crystals grown by a method comprising the steps of:

A) inserting drops of protein solution into a plurality of micro-well plates,

B) placing said plurality of micro-well plates onto a plurality of trays,

C) vertically placing said plurality of trays into a storage rack, comprising a plurality of vertically aligned storage slots,

D) transferring via a storage gantry utilizing vertical and horizontal movement said plurality of trays from said storage rack to an automated machine, said storage gantry being adopted to remove a tray from any one of said plurality of vertically aligned storage slots and to return a tray to any one of said plurality of vertically aligned storage slots,

E) analyzing via said automated machine said drops of protein solution,

F) transferring via said storage gantry utilizing vertical and horizontal movement said plurality of trays from said automated machine to said storage rack, and

G) controlling the movement of said storage gantry via at least one programmed computer system.

40) (currently amended) An automated storage and retrieval device for at least one micro-well plate holding subject matter, comprising:

A) a storage rack comprising a plurality of vertically aligned storage slots for vertically storing said at least one micro-well plate,

B) at least one automated machine,

C) a storage gantry for vertical and horizontal movement of said at least one micro-well plate between said storage rack and said at least one automated machine, said storage gantry being adopted to remove a tray from any one of said plurality of vertically aligned storage slots and to return a tray to any one of said plurality of vertically aligned storage slots, and

D) at least one computer system programmed to control said storage gantry.

41) (previously presented) The automated storage and retrieval device as in Claim 40, wherein said at least one automated machine is an inspection device comprising:

E) at least one camera,

F) an indexing device for sequentially placing said at least one micro-well plate in camera-view of said at least one camera, and

G) at least one control computer programmed to control said indexing device and said at least one camera, wherein said at least one control computer is programmed to receive from said at least one camera images of said subject matter in said at least one micro-well plate.

42) (new) The automated storage and retrieval device as in Claim 1, wherein said storage gantry is adapted to remove a tray from any one of said plurality of vertically aligned storage slots and transport the tray to said automated machine without disturbing any other tray.

43) (new) The automated storage and retrieval device as in Claim 1, wherein said storage gantry is adapted to transport a tray from said automated machine to any one of said plurality of storage slots that are empty of trays without disturbing any other tray.